No. 628,061. Patented July 4, 1899.

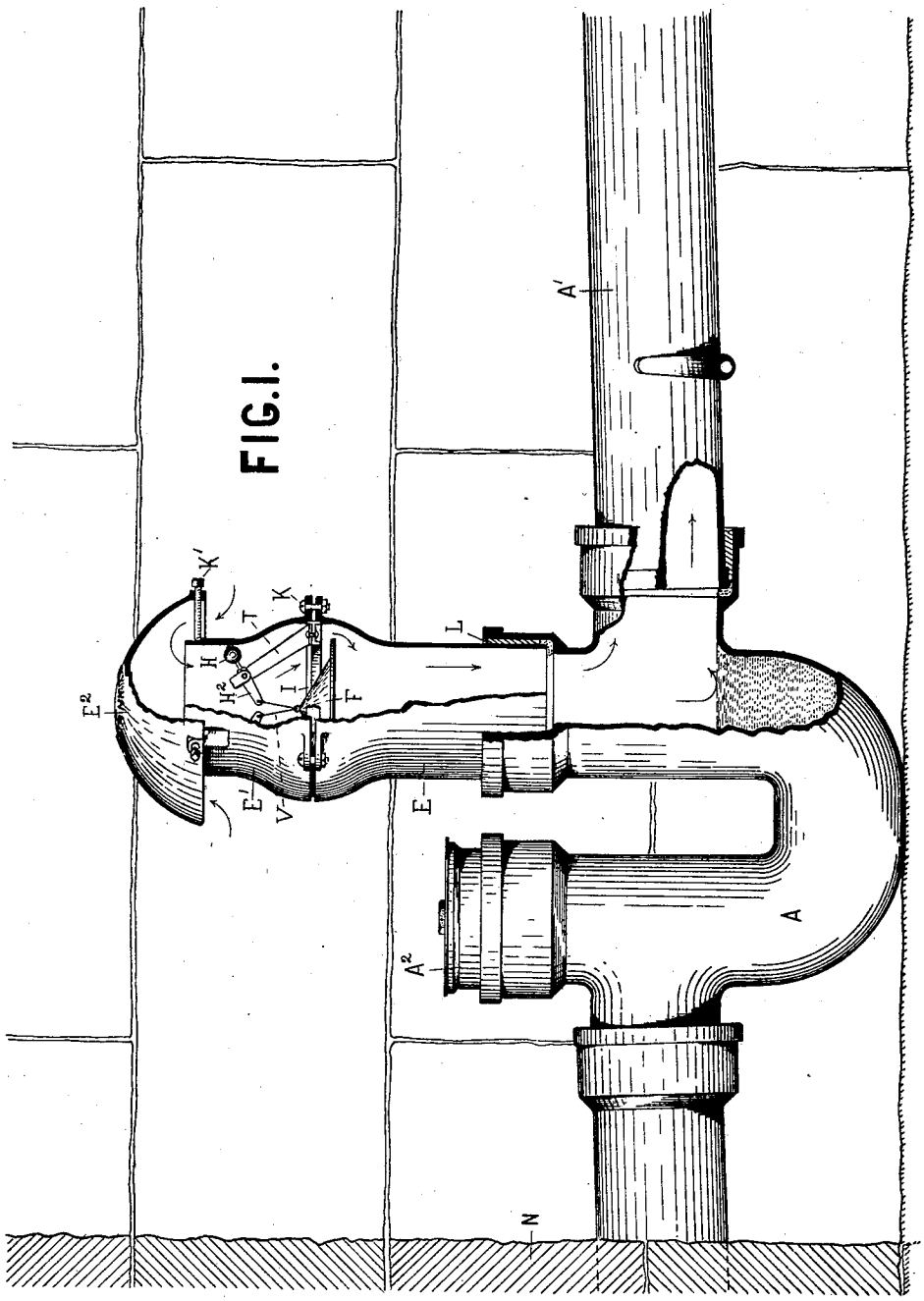
P. AYRES.

FRESH AIR INLET VALVE.

(Application filed Feb. 10, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.



WITNESSES:

Herbert H. Steele.

C. A. Rocks

INVENTOR.

Paul Ayres

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FIG 2

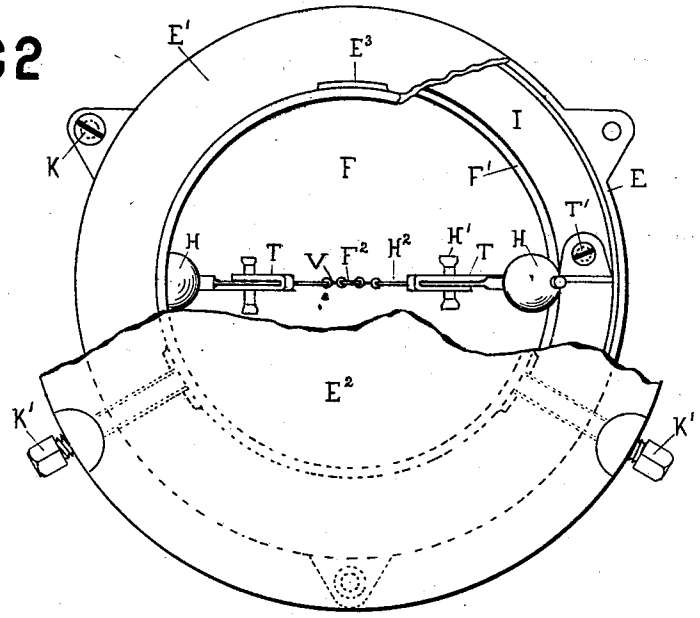
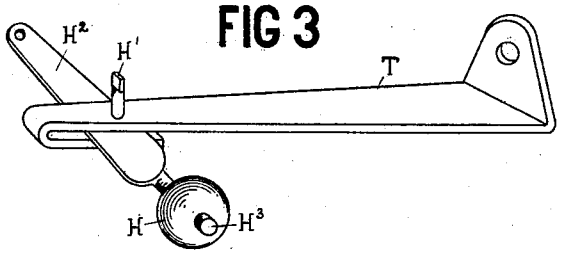


FIG 3



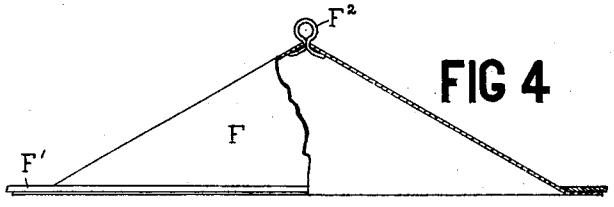


FIG 4

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UNITED STATES PATENT OFFICE.

PAUL AYRES, OF NEW YORK, N. Y.

FRESH-AIR-INLET VALVE.

SPECIFICATION forming part of Letters Patent No. 628,061, dated July 4, 1899.

Application filed February 10, 1898. Serial No. 669,745. (No model.)

To all whom it may concern:

Be it known that I, PAUL AYRES, a citizen of the United States, and a resident of New York, (Rockville Centre,) in the county of Queens and State of New York, have invented certain new and useful Improvements in Fresh-Air-Inlet Valves for the Sanitary Ventilation of Soil and Waste Pipes, of which the following is a specification.

My invention relates to improvements in fresh-air-inlet valves for the sanitary ventilation of soil and waste pipes, and more particularly to improvements in the devices shown and described in United States Letters Patent issued to me on the 14th day of September, 1897, and numbered 589,923; and the objects of my present invention are to reduce the weight of the valve and its counterweighted mechanism to a minimum of lightness, thereby rendering said valve more susceptible to the influence of variations in the atmospheric densities within the pipes, hence eliminating to a greater degree the possibility of "blow-backs" of foul gases of decomposition and fermentation of sewage through the inlet-orifice into the cellar when a closet is flushed or a tank, tub, basin, &c., discharged into the sewer-pipe; to so construct the inclosing shells that the valve mechanism may be readily removed therefrom and any obstruction or accumulation of sewage removed from the trap-well without disturbing the lower shell calked in the hub or hand-hole of the trap; to construct the body of the valve conical in contour out of thin non-corrodible sheet metal for the purpose of forming an air-chamber underneath, so that in the event of tide-water flooding the trap or the trap becomes choked with accumulations of sewage the valve will close to its seat through its own buoyancy, independent of atmospheric pressure.

Further objects and advantages of my invention will appear in the following description, and the novel features thereof will be pointed out in the appended claims.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 shows the valve constructed according to my invention mounted in the hub of the intercepting-trap, on the house side thereof, with portions of the outer or inclosing shells of the valve and trap broken away. Fig. 2 is a top or plan view of the valve, also showing a portion of the hood and inclosing shells broken away to better illustrate my invention. Fig. 3 is a detailed view in perspective of the angular arm that supports the counterweighted lever and its adjustable weight; and Fig. 4 is a detail view of the valve-cone and its flexible rubber ring, as will be hereinafter fully described.

The duty of the fresh-air inlet is, as its name implies, to permit or induce fresh air from the outer atmosphere to enter the drainage system and displace the foul air contained therein. Heretofore this has been attempted in various ways, the most common forms being what are generally known as the "low-down" and the "high," "U," or "roof" inlet. In the former method the vent-pipe runs from the trap to the curb and terminates at a cast-iron box fitted with a perforated or grated cover set flush with the pavement. Owing to the fact that the air within the pipes is nearly always less dense than the outer atmosphere, it naturally occurs under this system that the direction of the currents which are set in motion by this difference of density is toward the roof, unless some other force or forces cause them to flow in the opposite direction, causing what are commonly called "blow-backs." These blow-backs are liable to occur at all times whenever a fixture is flushed and delivers into the drainage system. Furthermore, the entire system is liable to be rendered useless by the street-box becoming clogged with accumulations of sand, coal-dust, grass, or snow and ice; and during exceedingly cold weather, if there is little or no water flowing constantly through the trap, there is a danger of the cold current of air rushing through the unobstructed street-vent, forming a cake of ice in the trap-well or even be the means of bursting the trap.

In the roof inlet system a natural ventilation must be dependent on the difference in temperature of the columns or stack-pipes, and since the inlet and outlet pipes are enveloped by the same atmosphere, both being run within the building, and since their upper ends are practically on the same level it stands to reason that there will be no venti-

lation of the system if one pipe is not warmer than the other, and as hot water flows through it at one time and cold water at another it follows that the currents set in motion by this variable density will flow in one direction at one time and in the opposite direction at another; but the velocity of these currents must be very low. Hence the gases evolved by the decomposition or fermentation of organic matter within the system cannot be conveyed to the outer atmosphere with any degree of reliability. If then the ventilation of the sanitary system is dependent upon the currents set in motion by the difference of density of the atmosphere within the pipes and the outer atmosphere, it follows that the fresh air must be introduced at the lowest possible point of the system to effectively force the foul gases through the stack-pipes to the roof. To carry this theory out in practice, I propose to mount a counterweighted valve and valve-seat, constituting an air-inlet, on the house side of the intercepting-trap A, which is of common design and construction, having, preferably, two upright hubs or hand-holes, the one nearest the front wall N or street side adapted to receive the usual trap-screw ferrule A^2 for the purpose of cleaning the trap and removing any accumulation of sediment therefrom.

In the construction of the valve as shown E and E′ designate, respectively, the lower and upper inclosing valve-casings or shells, each consisting of a semiglobular hollow pipe-like shell provided with exterior ears having holes therein to receive the binding-bolts K. Each shell is also provided with an annular flange or ledge around the inner edge adapted to receive a non-corrodible valve-ring I, which is inserted between said shells.

In practice the ledge of the lower shell E is formed by cutting away a portion of the upper edge of said shell in a lathe to a depth of about one-third the thickness of the ring. The ring is also turned true to a diameter a fraction larger than the bore of the shell and forced therein, forming practically an air and water tight joint. The ledge of the upper shell E′ is cast integral therewith and a little larger in diameter than the said ring to permit the said shell to fit loosely over the ring in the rough casting and the two shells clamped together by the bolts K. As a cheaper construction, both ledges of the said shells may be cast larger than the diameter of the ring and cement or other "joint" compound placed on the lower ledge, the rough unfinished ring pressed therein, and the two shells clamped as before, or the ring and the two shells may be cast in a single piece. The object of making this inclosing shell in two parts is twofold, namely: to permit of the shells being cast in iron and the ring I, which constitutes the valve-seat, in a non-corrodible composition metal, and, secondly, to provide a means of access to the trap by removing the upper shell and the valve-ring therefrom for the purpose of removing any obstruction from the trap-well without disturbing the lower shell that is calked in the hub. This feature is especially appreciated when the valve is mounted upon a trap having but one hub and no trap-screw ferrule.

The ring I where it engages the shells is T-shaped in cross-section, while the inner edge is provided with a downwardly-extending annular rib of sufficient depth and body to admit of its being turned down in a lathe to form a true concentric valve-seat.

The valve F is stamped or spun out of thin non-corrodible metal unaffected by moisture or the gases passing through the drain or trap and having formed integral therewith an annular flange adapted to support a soft flexible rubber ring or washer F′, cemented or otherwise attached thereto and designed to engage the aforesaid seat to form an air, gas, and water tight compartment within the lower shell. Preferably I would form this valve conical in shape to obtain a maximum strength to resist the internal pipe-pressure from a minimum thickness of metal, and also to form an air-chamber underneath said valve, so that in the event of tide-water flooding the trap and drain-pipe or the sewer or trap becoming clogged the specific gravity of the valve will by reason of this air-chamber become less than that of water, and the valve will close to its seat through its own buoyancy and prevent any overflow of sewage into the cellar.

To the apex of the cone of the valve F is mounted an eye F^2, formed and attached as shown in Fig. 4 and soldered or otherwise rigidly fixed thereto.

On the upper face of the ring I, diametrically opposite, are mounted two arms T T, that rise obliquely toward the center of the shell E′ and terminate with an inverted U, adapted to inclose on two sides the balance-levers H^2 H^2, and perforated near the ends to receive a pin H′, which acts as a fulcrum to said levers, as shown in Fig. 3. It will be observed that these levers consist of a small malleable rod screw-threaded at one end, H^3, to receive a tapped balance-ball or adjustable weight H, and flattened or compressed at the other are perforated near the extreme end to form an eye adapted to receive a wire link V, connecting the said lever directly with the eye F^2, mounted to the cone. Adjustment in this weight is not an absolute necessity, as the weight or ball can be formed integral with the rod after its proper position on the rod has once been located. By this arrangement it will be seen that the valve is held in a partial state of equilibrium—that is, the combined weight of the two balls should overbalance the valve sufficiently to cause it to rest against its seat when in its normal position and requiring a circulating draft to open it, as it is obvious that when the density of the air within the soil-pipes is the same or greater than the density of the atmosphere surrounding the inlet, or during the absence of a circulating draft either toward or from the roof-

outlet, the foul odors and gases of decomposition and fermentation in the trap would pass out through the inlet into the cellar; but as the valve is normally closed to its seat under such conditions such gases as are evolved are held within the pipes until such times as the circulating draft has acquired sufficient inertia to overcome the gravitative action of the weight, or the said gases are forced through the trap when several closets or other fixtures are flushed at the same time. All these several parts I preferably would construct from suitable composition metal to resist any tendencies toward corrosion.

The valve and its operating mechanism are protected from falling bodies by a cast bell-shaped hood E^2, which is drilled and tapped to receive screw-threaded set-screws K', extending inwardly and resting upon their seats or segmental ledges E^3, cast on the outside of the upper shell E', thus forming a circulating air-space between the said shell and hood.

The operation of this valved inlet as now described is as follows: If the sewer or drain pipe runs along the cellar wall above the ground and is provided with an intercepting-trap, the lower shell E of the valve is mounted in the hub on the house side of said trap and calked with oakum. The hood is then removed by loosening a set-screw K', and the valve forced to open and close to ascertain if it closes true to its seat, and the shell shifted in the hub until it does, when molten lead is introduced into the hub and around the shell in the ordinary way and the hood replaced. Should the atmosphere within the pipe and the atmosphere of the cellar be of a uniform density or should the atmosphere surrounding the roof-outlet have a greater density than the atmosphere surrounding the inlet, causing the circulating draft to pass downwardly through the stack-pipes, the valve remains closed to its seat. Should a closet be flushed or a basin emptied into the system, the water in rushing through the pipe toward the trap interrupts the air-currents and forces them back, thus generating an atmospheric pressure within the pipes that is greater than the pressure at the inlet. Hence the valve instantly closes and confines such gases as the pipe contains within the said pipe to be forced through the trap into the sewer or held therein until the circulating draft at the inlet has acquired sufficient inertia to reopen the valve and carry the gases up the vent-stacks through the roof outlet.

It is not necessary for the successful operation of my invention to place the valve on the hub of the intercepting-trap, as under certain conditions, especially where the plumbing is very old and a "U" or "running" trap, having no hub, is encountered, it becomes necessary to puncture the drain-pipe as near the said trap as practicable and mount a "saddle-hub" thereon in the usual way, and the valve placed therein as before.

In the case of the trap and drain-pipe being laid below the cellar bottom an upright pipe communicating with the trap or saddle-hub rises above the cellar bottom to a height of a foot or more and the valve set therein.

From the foregoing description it will be readily understood that for the successful working of my invention the sewer or drain pipe must be provided with a roof outlet-pipe and also an intercepting-trap, as it is the liquid seal of said trap which interrupts the air-currents in their downward course and causes a pressure to be generated within the pipe to equalize the outside pressure and close the valve to its seat for the purposes above set forth.

While I have shown and described in detail a specific form of my invention, it is obvious that changes in size, proportion, and mechanical details may suggest themselves in practice without departing from the spirit of my invention. I do not desire, therefore, to be limited to the precise construction and arrangement of parts as shown and described; but,

Having now fully described my invention and its mode of application, I desire to secure the same by Letters Patent and therefore claim—

1. In a sewerage or drainage system, the combination of a sewer or drain pipe having an intercepting-trap and a fresh-air inlet to said pipe on the house side of said trap, with a fresh-air-inlet valve, comprising a casing mounted to said inlet and provided with an inner flange; a concentric valve-ring provided with a valve-seat, removably secured within said flange; an upper casing mounted on said ring and provided with a circulating air-space; sheet-metal arms mounted on the upper face of said ring; counterweighted levers pivotally mounted to said arms; and a rubber-seated valve, suspended from said levers, substantially as described.

2. In a sewerage or drainage system, the combination of a sewer or drain pipe having an intercepting-trap and a fresh-air inlet to said pipe on the house side of said trap, with a fresh-air-inlet valve, comprising a casing mounted to said inlet and provided with an inner flange; a valve-ring having a concentric valve-seat, removably secured within said flange; an upper casing mounted on said ring and provided with a hood and circulating air-space; sheet-metal arms, mounted on the upper face of said ring; counterweighted levers, pivotally hung to said arms; and a rubber-seated cone-valve, suspended from said levers, and formed from thin sheet metal to provide an air-chamber underneath, for the purpose of rendering said valve more susceptible to the influences of variations in the atmospheric densities within the pipe, substantially as described.

3. In a sewerage or drainage system, the combination of a sewer or drain pipe having an intercepting-trap and a fresh-air inlet to said pipe on the house side of said trap, with

a fresh-air-inlet valve, comprising a casing mounted to said inlet and provided with an inner flange; a valve-ring provided with a concentric valve-seat, removably secured within said flange; an upper casing, mounted on said ring, and provided with a hood and a circulating air-space; arms, mounted on the upper face of said ring; counterweighted levers pivotally hung to said arms; and a rubber-seated cone-valve, suspended from said levers, and comprising a cone portion, formed from thin sheet metal, to provide an air-chamber underneath, an annular rim formed integral therewith on a plane with the base thereof and adapted to support a rubber washer, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 3d day of February, 1898.

PAUL AYRES.

Witnesses:
C. T. ROCKS,
HERBERT H. STEELE.